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ABSTRACT

A Mechanics 12 course was chosen by the Alberta Correspondence School for a field trial of computerized delivery systems of vocational education programs to small rural schools where enrollment is low and the construction of vocational laboratories is economically impractical. The Telidon videotex system, which was initially selected, is composed of a display monitor (a television set), an interface decoder device, a telecommunication system, and a central computer. Community resources were employed to allow students to complete the practical component of the course under the supervision of a local mechanic. An evaluation addressed student attitudes toward distance education as delivered via Telidon, relative student achievement, and relative program delivery costs and results. An alternative delivery system, designed to eliminate high transmission costs, was later developed by linking a Telidon terminal to an Apple II microcomputer with a single disk drive. It was piloted in the second semester of 1983-84 with a high level of success and was favorably received by students and teachers. Additional vocational education courses on electricity-electronics and building construction are also being adapted for computer assisted delivery. Two references are listed. (LMM)

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INTERNATIONAL COUNCIL FOR

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EXTENDING OPPORTUNITY: TELIDON TECHNOLOGY IN VOCATIONAL EDUCATION

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Provision of Educational Opportunities for Rural Students

One of the principal aims of public education is to ensure equal educational opportunities for all. This goal is, however, an extremely difficult one to achieve even in urban areas where large, comprehensive schools can provide a wide variety of courses to cater to the needs, interests and talents of students. In rural areas where the population is quite dispersed this goal is infinitely more difficult to attain. Since 1923, correspondence education has been one means of providing educational services to students in rural areas of Alberta. These students were either living in isolated areas or were attending a small rural school and required correspondence courses to augment the limited number of courses available in the school.

As transportation and road systems improved in Alberta in the 1950's and 1960's, our Provincial authorities aimed at providing equal educational opportunities for rural students through consolidation of schools. Only in such centralized schools was it economically feasible to offer comprehensive programmes which would cater to the needs of students of varying abilities and interests.

By the late 1970's, however, the reality had to be faced that further centralization was no longer feasible. With a declining rural population and increased transportation costs in most jurisdictions, school boards had no option but to restrict once again the number of course offerings available. Consequently, the programmes offered tended to be primarily academic. Students who have little interest in pursuing academic studies frequently drop out of school destined to join the ranks of the unemployed or underemployed. In Saskatchewan, our neighbouring province, which is also essentially rural, a 1981 study indicated that approximately one quarter of all rural high school students drop out of school unless they are provided with a well-rounded school programme.

Many school jurisdictions are now concerned about finding ways to deliver comprehensive education programmes in areas with small enrollments. If we believe it is essential to ensure equal educational opportunities in rural as well as urban areas, special programmes must be delivered even in areas of low enrollment and some means must be found to provide option courses, such as vocational education courses, to those rural students whose interests and abilities lie in technical areas.

Correspondence Education and the New Technologies

At the same time that rural school boards were realizing consolidation of schools had gone just about as far as it could go, the Alberta Correspondence School was examining its delivery system. When the Post Office, the traditional delivery system for correspondence study, is used, the response time is usually several days. The Alberta Correspondence School, however, wanted to be able to respond more quickly and, therefore, decided to experiment with computerized delivery systems as a means of providing the student with immediate feedback. We hoped the quick response to tests and exercises would facilitate learning and help to maintain student interest in the course.

Another advantage which a computerized system has over the traditional correspondence pencil and paper method is that looping, which can provide additional exercises and explanations to help a student master a particular concept, can be built into the system. Looping allows a misunderstanding to be corrected while the student is working on a particular problem. By this means, distance education can provide almost the same immediate response to a problem as is possible in a classroom situation.

A third advantage of a computerized system for the Alberta Correspondence School is that the School can, through the telephone system, access a delivery system which reaches almost all schools and homes in the Province.

Telidon Technology

One computerized system which the Alberta Correspondence School decided to experiment with was the Telidon system. This is a videotex system which permits information stored in data banks to be retrieved in the home, office, or school. Many foresee this marriage of computer and telecommunications as a revolution in information systems. They believe the electronic transmission of information will prove to be the most efficient and cost-effective means of transmission.

The Telidon system is composed of:

(1) a display monitor (a television set),

(2) an interface decoder device,

(3) a telecommunication system, and

(4) a central computer.

Similar videotex systems such as the British view-data system, and the French Telitext system, have been developed, but Canadian developers believe the Telidon system has several advantages.

The Alberta Correspondence School found that videotex technology has the following advantages for education. It has superior graphics capabilities which allow pictures to be created quickly and effectively; it has a large range of colours and many shades available for graphics; and there is no limit to the complexity of the graphic design and even the facsimile of a photographic image or simulated animation can be transmitted. The Telidon system is also extremely user "friendly". Neither the publisher nor the user needs to know anything about the computer language, and no special skills are required. The user can access the data bank quickly and simply with either the hand-held keypad or a full keyboard. Tree logic is employed to allow the user to get to the information required by pressing the appropriate numbers.

Our staff found the Telidon system a delight to work with. The page creation computer made entry of information so simple that clerical staff, with only minimal training, could input the material prepared by the professional staff.

Adaptation of the Mechanics 12 Course for Delivery by Telidon

The Telidon system seemed to be one means for the Alberta Correspondence School to deliver a vocational education programme to small rural schools where enrollment is quite low and the construction of vocational laboratories is impractical economically. The vocational education course selected for the field trial was Mechanics 12. This particular course was selected because it is extremely popular with an enrollment of approximately 1,200 students each year.

When the media available, print material and Telidon, were examined, both were found to have some advantages. The print materials provide the student with considerable flexibility as they are easily portable and the student can work on them anywhere and any time. The Telidon system can, on the other hand, provide immediate feedback which is not possible with the exclusive use of the print medium. After weighing the merits of both media and considering the needs of the students, the Alberta Correspondence School staff decided that a hybrid system would be most appropriate for this course. The instructional component would be delivered via print materials and the student response component via the Telidon system.

There was, however, another problem to be solved. Practical laboratory experience is an essential ingredient in any vocational education course. The Alberta Correspondence School had to consider how it could include the practical component for students in schools with no vocational education laboratories. The solution was to use community resources. In most local communities, there is at least one garage operated by a journeyman mechanic and the participating schools arrange for their students to do the practical component of the course under the supervision of the local mechanic.

In adapting the student response component of Mechanics 12 for delivery via Telidon, between one and two hundred document pages had to be developed and entered into the computer for each lesson. All of the

exercises were presented in a multiple choice format, and students indicated their selections by entering a number on a keypad. Each time a student entered a response to a question, a message appeared on the screen indicating whether or not the selected answer was correct. If a wrong response was given, additional material giving further explanations or providing remedial exercises usually appeared. As this delivery system could cater so effectively to individual needs, most students did not follow exactly the same path through any lesson.

Evaluation of the Field Trial

In order to assess the effectiveness of the Telidon delivery system in comparison to the traditional correspondence school methodology, the evaluation study addressed several areas including student attitudes towards distance education as delivered via Telidon, relative student achievement, and relative programme delivery costs.

For the purpose of this comparative study, the students were divided into two groups. The comparison group took traditional correspondence instruction and the experimental group worked through their exercises on the Telidon system. The results achieved by both these groups were also compared to the results of classroom students.

The study found that:

(1) the instruction utilizing Telidon was at least as effective as traditional correspondence instruction and both forms of correspondence education produced better results than conventional in-school instruction;

(2) there was a significantly higher completion rate for the Telidon group than for the traditional correspondence group;

(3) students were very supportive of the use of the Telidon system.

The study recommended that the Alberta Correspondence School continue the development of computer-based learning materials and the practical shop experience.

Observations

Although the Telidon system was not designed as an educational tool, the Alberta Correspondence School realized that this type of interactive system could provide the means of improving and expanding the delivery of correspondence courses. Besides its excellent graphics capabilities, the major advantage for the Alberta Correspondence School was the simplicity of the system. The staff required no special training in computer programming and quickly learned to manipulate the system with only minimal training in its operation.

One problem this delivery system could have is costly line changes. Therefore, means of lowering transmission costs were investigated. In the Alberta Correspondence School field trail, Datapac lines were used wherever possible. This type of transmission was most effective in reducing line costs since transmission via Datapac line is most inexpensive.

The Alberta Correspondence School Telidon field trial was significant not only in its utilization of a new technology but also in its involvement of many organizations including Alberta Government Telephones, Alberta Education, and school jurisdictions in a co-operative effort. All the participants recognized the need to provide rural students with more comprehensive programmes. They worked with determination to solve the problems and to devise new systems which would ensure the delivery of more appropriate educational services to students in rural areas.

Downsizing to a Microcomputer

Although the Telidon experiment was well received, it was most expensive, especially for Alberta Government Telephones who had absorbed the computer and transmission costs. When the field trial ended and Alberta Government Telephones no longer assumed responsibility for the transmission costs, many of the local schools had to drop the programme

because they could not afford the telephone charges. The Alberta Correspondence School then began to consider alternate delivery systems which would eliminate the high transmission costs. By linking a Telidon terminal to an Apple II, the Alberta Correspondence School was able to eliminate the line charges and still offer the students all the features built into the Telidon Mechanics 12 course. In addition, the lessons are graded on completion and the operations are centralized with control at the Alberta Correspondence School.

This microcomputer delivery system is still very "user friendly" as students with only very limited knowledge of keyboards have no problems using the system. One feature of this system which students appreciate is the ability of the system to return a student to the point in the lesson where he stopped work previously. On completion of the lesson, this system will provide the student with his mark for that lesson.

In order to keep costs to a minimum, this microcomputer-Telidon system was designed for only one disk drive. Twelve diskettes, one for each lesson, are required for the Mechanics 12 course. One diskette can carry up to 255 pages for student exercises. The diskette also has sufficient capacity to store data on student references for at least fifty students.

When this particular microcomputer-Telidon configuration was piloted in the second semester of 1983-84, it had a very high level of success and was favourably received by students and teachers. Yet even this system is not without its limitations. These include the need to send and return the diskettes by mail; the difficulty of correcting programming errors once the diskettes have been distributed; and the increased opportunity for students to alter records even though the programme has been written in FORTH - a computer language which is not widely used. Most of these difficulties could, however, be overcome if a cost-effective telecommunications network were established in Alberta.

Future Developments

The Alberta Correspondence School is now adapting other vocational education courses for computer assisted delivery. The new Building Construction 12 course should be available by February, 1984 and Electricity-Electronics 12 should be ready for September, 1985. During this current school year, the Alberta Correspondence School will commence work on the adaptation of other courses which are in demand but are not readily available to students in small schools.

In previous decades the aim in Alberta was to provide equal educational opportunities through the centralization of schools and transportation technology. When this technology was fully exploited and the goal was still not achieved, other means of attaining the goal had to be investigated. This Alberta Correspondence School experiment which combines correspondence education, computer technology, and local community resources does show some promise of being one method of extending educational opportunities for students attending small rural high schools.

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